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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/604,610	08/04/2003	Dennis L. Macaluso	BUR920020127US1	1609
24241	7590	01/12/2005	EXAMINER	
IBM MICROELECTRONICS INTELLECTUAL PROPERTY LAW 1000 RIVER STREET 972 E ESSEX JUNCTION, VT 05452			LE, JOHN H	
			ART UNIT	PAPER NUMBER
			2863	

DATE MAILED: 01/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/604,610	Applicant(s) MACALUSO ET AL.	
	Examiner John H Le	Art Unit 2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 27 is/are allowed.
- 6) ☒ Claim(s) 1,2,5,16-29 and 31 is/are rejected.
- 7) ☒ Claim(s) 3,4,6-15,30 and 32-34 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>02/18/04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Meier et al. (USP 5,884,242).

Regarding claims 1 and 28, Meier et al. disclose a program storage device readable by a machine, tangibly embodying a program of instructions executable by a machine to perform a method of locating a source of a localized elevation on a substrate (e.g. Fig.1, Col.2, lines 35-59), comprising the steps of: (a) measuring a first surface of a plurality of substrates to obtain topography measurements a plurality of substrates placed separately on a chuck (Fig.3, Col.3, lines 16-66, Claim 23); (b) detecting the presence of a localized elevation in a field on the first surface of the substrates (Focus spot detection engine 235, Col.3, lines 16-66, Claim 23) and (c) determining whether the source results from the chuck (focus spot is reported, Col.3, lines 41- Col.4, line 43).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 5, 16-20, 23-26, 29, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meier et al. (USP 5,884,242) in view of Park et al. (USP 6,198,982).

Regarding claims 2 and 29, Meier et al. fail to teach the topography measurements include height, pitch, and roll measurements.

Park et al. teach the topography measurements include height, pitch, and roll measurements (X, Y, Z, Figs.6, 9A, 9B, 9C, Col.5, lines 1-Col.6, line 12).

Regarding claims 5 and 31, Meier et al. teach detecting the presence of the localized elevation on at least three substrates (Fig.6, Claim 23).

Regarding claim 16, Park et al. teach when the presence of the localized elevation is detected, issuing an alarm (alarm unit 38, Col.6, lines 31-37).

Regarding claim 17, Park et al. teach when substrates are being processed in a tool, preventing processing of subsequent substrates until corrective action is taken to eliminate the source of the localized elevation (e.g. Col.4, lines 45-52).

Regarding claim 18, Park et al. teach when the source of the localized elevation is related to the chuck, providing the X/Y coordinates of the source of the localized elevation so that corrective action on the chuck can be directed to a corresponding location on the chuck (e.g. Col.4, lines 14-52).

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Regarding claim 19, Park et al. teach X/Y coordinates of the source of the localized elevation are correlated (Fig.6) to a step array map (wafer map, Fig.3) to determine which chips are affected by the localized elevation (e.g. Col.4, lines 14-37).

Regarding claim 20, Park et al. teach the affected chips are further correlated to a known yield distribution by substrate region (e.g. Col. 6, lines 37-43).

Regarding claim 23, Meier et al. teach patterning an image on said first surface using a photolithographic tool (Col.Col.2, lines 35-39).

Regarding claim 24, Meier et al. teach the topography measurements are obtained from focus parameter data from the photolithographic tool (e.g., Fig.1, Col.2, lines 35-47).

Regarding claim 25, Meier et al. teach locating the source of the localized elevation is independent of imaging level or underlying optical qualities (e.g. electron beam, Col.2, lines 35-44).

Regarding claim 26, Meier et al. teach each substrate is analyzed to detect the presence of a localized elevation (e.g. Col.3, lines 6-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to inform the topography measurements include height, pitch, and roll measurements as taught by Park et al. in a program storage device readable by a machine of Meier et al. for purpose of providing a method of and apparatus for detecting the presence of particles beneath a wafer on the

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wafer holder of semiconductor exposure equipment (Park et al., Col.1, lines 56-60).

Allowable Subject Matter

5. Claim 27 is allowed.
6. Claims 3-4, 6-15, 30, 32-34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 3, none of the prior art of record teaches or suggests the combination of a method of locating a source of a localized elevation on a substrate, comprising the steps of: (a) measuring a first surface of a plurality of substrates placed separately on a chuck to obtain topography measurements; (b) detecting the presence of a localized elevation in a field on the first surface of the substrates; and (c) determining whether the source results from the chuck, wherein the topography measurements include height, pitch, and roll measurements and wherein the step (b) further comprises comparing said z, pitch, and roll measurements to pre-defined limits, wherein the localized elevation is detected when any one of said z, pitch, and roll measurements exceeds said pre-defined limit. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

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Regarding claim 6, none of the prior art of record teaches or suggests the combination of a method of locating a source of a localized elevation on a substrate, comprising the steps of: (a) measuring a first surface of a plurality of substrates placed separately on a chuck to obtain topography measurements; (b) detecting the presence of a localized elevation in a field on the first surface of the substrates; and (c) determining whether the source results from the chuck, wherein the topography measurements include height, pitch, and roll measurements, wherein the step (b) comprises detecting the presence of the localized elevation on at least three substrates, and wherein the step (c) comprises: calculating a best linear regression fit line for each pair of pitch-z, roll-pitch and z-roll measurements in the field; calculating R^2 for each of the calculated best linear regression fit lines; and comparing R^2 to a threshold value. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 21, none of the prior art of record teaches or suggests the combination of a method of locating a source of a localized elevation on a substrate, comprising the steps of: (a) measuring a first surface of a plurality of substrates placed separately on a chuck to obtain topography measurements; (b) detecting the presence of a localized elevation in a field on the first surface of the substrates; (c) determining whether the source results from the chuck; and (d) setting a limit for a maximum number of localized elevations that are detected so that a corrective action can be taken to eliminate the source of the localized

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elevation. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 27, none of the prior art of record teaches or suggests the combination of a computer-readable program product for Causing a computer to detect and characterize a defect on a surface of a first wafer, comprising: a first program code means embodied in a computer useable medium for causing the computer to carry out a first set of measurements on a given surface of said first wafer placed on a chuck prior to carrying out an operation on said given surface; a second program code means embodied in a computer useable medium for causing the computer to carry out a second set of measurements on said given surface of said first wafer while carrying out said operation on said given surface; a third program code means embodied in a computer useable medium for causing the computer to determine a difference between said first set of measurements and said second set of measurements; a fourth program code means embodied in a computer useable medium for causing the computer to carry out said first set of measurements, said second set of measurements and said difference measurement on a second wafer placed on the chuck; a fifth program code means embodied in a computer useable medium for causing the computer to carry out said first set of measurements, said second set of measurements and said difference measurement on a third wafer placed on the chuck; and a sixth program code means embodied in a computer useable medium for causing the computer to compare said measurements from said first

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wafer, said second wafer, and said third wafer to determine whether a defect results from said chuck. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 30, none of the prior art of record teaches or suggests the combination of a program storage device readable by a machine, tangibly embodying a program of instructions executable by a machine to perform a method of locating a source of a localized elevation on a substrate, comprising the steps of: (a) measuring a first surface of a plurality of substrates placed separately on a chuck to obtain topography measurements; (b) detecting the presence of a localized elevation in a field on the first surface of the substrates; and (c) determining whether the source results from the chuck, wherein the topography measurements include height, pitch, and roll measurements, and wherein the step (b) further comprises comparing said z, pitch, and roll measurements to pre-defined limits, wherein the localized elevation is detected when any one of said z, pitch, and roll measurements exceeds said pre-defined limit. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 32, none of the prior art of record teaches or suggests the combination of a program storage device readable by a machine, tangibly embodying a program of instructions executable by a machine to perform a

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method of locating a source of a localized elevation on a substrate, comprising the steps of: (a) measuring a first surface of a plurality of substrates placed separately on a chuck to obtain topography measurements; (b) detecting the presence of a localized elevation in a field on the first surface of the substrates; and (c) determining whether the source results from the chuck, wherein the topography measurements include height, pitch, and roll measurements, wherein the step (b) comprises detecting the presence of the localized elevation on at least three substrates, and wherein the step (c) comprises: calculating a best linear regression fit line for each pair of pitch-z, roll-pitch and z-roll measurements in the field; calculating R^2 for each of the calculated best linear regression fit lines; and comparing R^2 to a threshold value. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John H Le whose telephone number is 571-272-2275. The examiner can normally be reached on 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E Barlow can be reached on 571-272-2269. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.


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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

John H. Le

Patent Examiner-Group 2863

January 5, 2005



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